Substitute for form 1449APPTO
INFORMATION DISCLOSURE
STATEMENT BY APPLICANTE
(Use as many sheets as necessary)

Complete if Known	indicated to Jacobson to a contract of the con	
Application Number	09/944981	CEN
Filing Date	August 30, 2001	BECO
First Named Invent r	Ahn, Kie	7.7
Group Art Unit	2812	Join
Examiner Name	Lindsay, Walter	Desc.
-		A Charles

heet 1 of 12	ENT & TRAVE	Attorney Docket No: 1303.021US1	

US PATENT DOCUMENTS							
						Filing Date If Appropriate	
11/1	US- 2001/0002280	05/31/2001	Sneh, Ofer	427	255.28	12/22/2000	
WL	US- 2001/0009695 A1	07/26/2001	Saanila, Ville A., et al.	427	255.39	01/18/2001	
W	US- 2001/0042505	11/22/2001	Vaartstra, Brian A.	117	104	07/18/2001	
WI_	US- 2001/0051442 A1	12/13/2001	Katsir, Dina , et al.	438	758	06/28/2001	
WI	US- 2001/0053082 A1	12/20/2001	Chipalkatti, Makarand H., et al.	362	496	12/22/1999	
	US- 2002/0192974	12/19/2002	Ahn, Kie Y., et al.	438	722	06/13/2001	
WL	US- 2002/0001971	01/03/2002	Cho, Hag-ju	438	765	06/27/2001	
WL	US- 2002/0022156 A1	02/21/2002	Bright, Clark I.	428	698	08/24/2001	
WL	US- 2002/0119297	08/29/2002	Forrest, Stephen R., et al.	428	199	12/21/2001	
W	US- 2002/0146916 A1	10/10/2002	Irino, Kiyoshi , et al.	438	785	03/29/2002	
WL	US- 2003/0001212	01/02/2003	Hu, Yongjun , et al.	257	388	08/29/2002	
WL	US- 2003/0001241 A1	01/02/2003	Chakrabarti, Utpal K., et al.	257	643	05/28/2002	
WL	US- 2003/0003722	01/02/2003	Vaartstra, Brian A.	438	656	08/19/2002	
WL	US- 2003/0042526	03/06/2003	Weimer, Ronald A.	257	309	08/29/2001	
WC	US- 2003/0052356	03/20/2003	Yang, Haining , et al.	257	309	10/11/2002	
WL	US- 2003/0052358	03/20/2003	Weimer, Ronald A.	257	310	10/25/2002	
WL	US- 2003/0102501_	06/05/2003	Yang, Haining , et al.	257	295	12/12/2002	

EXAMINER WINE - LEWIN - DATE CONSIDERED 7/8/04

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICABIT (Use as many sheets as necessary) Attorney Docket No: 1303.021US1 Sheet 2 of 12

US-6,057,271

EXAMINER

05/02/2000

	- Parte
09/944981	BECEIVE
August 30, 2001	300
Ahn, Kie	77/1/ 5.3 50/
2812	
Lindsay, Walter	ECHOENIE .
	August 30, 2001 Ahn, Kie 2812

WL	US- 2003/0119313	06/26/2003	Yang, Haining , et al.	438	681	12/05/2002		
CUL	US- 2003/0157764	08/21/2003	Ahn, Kie Y., et al.	438	212	02/20/2002		
W.	US- 2003/0175411 A1	09/18/2003	Kodas, Toivo T., et al.	427	58	10/04/2002		
INL	US- 200/30222300	12/04/2003	Basceri, Cem , et al.	257	309	03/13/2003		
WL	US- 2003/0228747	12/11/2003	Ahn, Kie Y., et al.	438	591	06/05/2002		
ML	US-3,381,114	04/30/1968	Nakanuma, Sho	219	385	12/18/1964		
ML	US-4,394,673	07/19/1983	Thompson, Richard D., et al.	357	15	09/29/1980		
IN	US-4,413,022	11/01/1983	Suntola, Tuomo S., et al.	427	255.2	06/21/1979		
ialia	US-4,590,042	05/20/1986	Drage, David J.	422	186.06	12/24/1984		
IN	US-4,767,641	08/30/1988	Kieser, Jorg, et al.	427	38	07/03/1986		
Wh	US-4,993,358	02/19/1991	Mahawili, Imad	118	715	07/28/1989		
INI	US-5,006,192	04/09/1991	Deguchi, Mikio	156	345	11/21/1988		
WL	US-5,055,319	10/08/1991	Bunshah, Rointan F., et al.	427	38	04/02/1990		
alv	US-5,080,928	01/14/1992	Klinedinst, Keith A., et al.	427	70	10/05/1990		
WIL	US-5,198,029	03/30/1993	Dutta, Arunava, et al.	118	303	02/19/1992		
WL	US-5,595,606	01/21/1997	Fujikawa, Yuichiro , et al.	118	725	04/18/1996		
136	US-5,621,681	04/15/1997	Moon, Jong	365	145	03/22/1996		
WL	US-5,698,022	12/16/1997	Glassman, Timothy E., et al.			08/14/1996		
WL	US-5,735,960	04/07/1998	Sandhu, Gurtej S., et al.	118	723 IR	04/02/1996		
1.11	US-5,744,374	04/28/1998	Moon, Jong	437	60	11/18/1996		
w	US-5,789,030	08/04/1998	Rolfson, J B.	429	309	03/18/1996		
11/4	US-5,840,897	11/24/1998	Kirlin, Peter, et al.	546	2	06/07/1995		
Tul	US-5,916,365	06/29/1999	Sherman, Arthur	117	92	08/16/1996		
WIL	US-5,950,925	09/14/1999	Fukunaga, Yukio , et al.	239	132.3	10/10/1997		
WL	US-5,972,847	10/26/1999	Feenstra, Roeland, et al.	505	473	01/28/1998		
WI	US-6,010,969	01/04/2000	Vaarstra, Brian A.	438	758	10/02/1996		
WL	US-6,025,627	02/15/2000	Forbes, Leonard , et al.	257	321	05/29/1998		
								

Kenjiro, Higaki, et al.

475

DATE CONSIDERED

505

06/07/1995

Substitute for form 1449A/PTO
INFORMATION DISCLOSURE
STATEMENT BY APPLICANT
(Use as many sheets as necessary) Sheet 3 of 12

Complete # Known		
Application Number	09/944981	DECENED
Filing Date	August 30, 2001	BEDEN
First Named Inventor	Ahn, Kie	29 2004
Group Art Unit	2812	Mill Fa
Examiner Name	Lindsay, Walter	RATINA
Attorney Docket No: 1	303.021US1	THE CENTER

Attorney Docket No: 1303.021US1

WL	US-6,059,885	05/09/2000	Ohashi, Tadashi , et al.	118	730	12/16/1997
1,9/	US-6,093,944	07/25/2003	VanDover, Robert B.	257	310	06/04/1998
Win	US-6,110,529	08/29/2000	Gardiner, R. A., et al.	427	250	06/07/1995
we	US-6,120,531	09/19/2000	Zhou, Lin , et al.	607	111	10/17/1997
WL	US-6,161,500	12/19/2000	Kopacz, Stanislaw , et al.	118	723 E	09/30/1997
WL	US-6,187,484	02/13/2001	Glass, Thomas R., et al.	430	5	08/31/1999
WL	US-6,203,613	03/20/2001	Gates, Stephen M., et al.	117	104	10/19/1999
WV	US-6,206,972	03/27/2001	Dunham, Scott W.	118	715	07/08/1999
W	US-6,207,589	03/27/2001	Ma, Yanjun , et al.	438	785	02/29/2000
INL	US-6,217,645	04/17/2001	Vaartstra, Brian A.	106	287.18	09/02/1999
116	US-6,225,237	05/01/2001	Vaartstra, Brian A.	438	778	09/01/1998
WL	US-6,232,847	05/15/2001	Marcy, 5th, Henry O., et al.	331	167	05/28/1998
1.16	US-6,273,951	08/14/2001	Vaartstra, Brian A.	117	104	06/16/1999
WL	US-6,281,144	08/28/2001	Cleary, Thomas J., et al.	438	780	07/15/1999
h	US-6,291,866	09/18/2001	Wallace, Robert M., et al.	257	410	10/20/1999
TUL.	US-6,294,813	09/25/2001	Forbes, Leonard , et al.	257	321	02/15/2000
IJL	US-6,297,516	10/02/2001	Forrest, Stephen R., et al.	257	40	06/25/1999
WL	US-6,302,964	10/16/2001	Umotoy, Salvador P., et al.	118	715	03/16/2000
W	US-6,331,465	12/18/2001	Forbes, Leonard, et al.	438	260	02/15/2000
WL	US-6,348,386	02/19/2002	Gilmer, David C.	438	288	04/16/2001
Wi	US-6,368,398	04/09/2002	Vaartstra, Brian A.	106	28718	01/19/2001
Wh	US-6,368,518	04/09/2002	Vaartstra, Brian A.	216	67	08/25/1999
WL	US-6,380,579	04/30/2002	Nam, Sang-don , et al.	257	306	04/11/2000
[NL	US-6,391,769	05/21/2002	Lee, Jong-myeong, et al.	438	643	03/14/2000
الرا	US-6,420,279	07/16/2002	Ono, Yoshi , et al.	438	785	06/28/2001
M	US-6,432,779	08/13/2002	Hobbs, Christopher, et al.	438	287	01/30/2001
Wi	US-6,444,039	09/03/2002	Nguyen, Tue	118	715	03/07/2000
WL	US-6,444,895	09/03/2002	Nikawa, Kiyoshi	136	212	09/24/1999
W	US-6,445,023	09/03/2002	Vaartstra, Brian, et al.	257	295	03/16/1999

EXAMINER

DATE CONSIDERED

Substitute for form 1449A/PTO INFORMATION DISCLOSURE STATEMENT BY APPLICANE
(Use as many sheets as necessary)

Complete if Known		
Application Number	09/944981	
Filing Date	August 30, 2001	PRENED
First Named Inventor	Ahn, Kie	PIED
Group Art Unit	2812	354 23 7004
Examiner Name	Lindsay, Walter	Jon
		-70

•		1 ;
Shoot	4 of 12	
Direct	70112	

Attorney Docket No: 1303.021US1

WZ	US-6,448,192	09/10/2002	Kaushik, Vidya S.	438	785	04/16/2001
UK	US-6,451,695	09/17/2002	Sneh, Ofer	438	685	12/22/2000
W	US-6,455,717	09/24/2002	Vaartstra, Brian A.	556	1	08/28/2000
WC	US-6,458,701	10/01/2002	Chae, Yun-sook , et al.	438	680	10/12/2000
4/6	US-6,465,334	10/15/2002	Buynoski, Matthew S., et al.	438	591	10/05/2000
all	US-6,482,740	11/19/2002	Soininen, Pekka J., et al.	438	686	05/15/2001
7.7.	US-6,498,063	12/24/2002	Ping, Er-Xuan	438	253	10/12/2001
TH.	US-6,514,828	02/04/2003	Ahn, Kie Y., et al.	438	297	04/20/2001
Wi.	US-6,518,610	02/11/2003	Yang, Haining, et al.	257	295	02/20/2001
Wh	US-6,521,911	02/18/2003	Parsons, Gregory N., et al.	257	52	07/19/2001
iNL	US-6,524,867	02/25/2003	Yang, Haining, et al.	438	3	12/28/2000
ive	US-6,524,901	02/25/2003	Trivedi, Jigish D.	438	183	06/20/2002
INL	US-6,534,420	03/18/2003	Ahn, Kie Y., et al.	438	768	07/18/2001
WL	US-6,573,199	06/03/2003	Sandhu, Gurtej S., et al.	438	798	08/30/2001
111	US-6,586,792	07/01/2003	Ahn, Kie Y., et al.	257	295	03/15/2001
Wis	US-6,593,610	07/15/2003	Gonzalez, Fernando	257	296	12/13/2001
WL	US-6,602,338	08/05/2003	Chen, San-Yuan , et al.	106	287.19	04/11/2001
1.11	US-6,608,378	08/19/2003	Ahn, Kie Y., et al.	257	701	08/26/2002
WL	US-6,613,702	09/02/2003	Sandhu, Gurtej S., et al.	438	798	01/17/2003
[a] i.	US-6,639,267	10/28/2003	Eldridge, Jerome M.	257	310	07/29/2002
173	US-6,661,058	12/09/2003	Ahn, Kie Y., et al.	257	344	02/11/2002
125	US-6,682,602	01/27/2004	Vaartstra, Brian A.	118	715	08/19/2002
WL	US-6,683,005	01/27/2004	Sandhu, Gurtej S., et al.	438	715	01/17/2003

	FOREIGN PATENT DOCUMENTS								
Examiner Initials*	Foreign Document No	Publication Date	Name of Patentee or Applicant of cited Document	Class	Subclass	T²			
WL	JP-5090169	04/09/1993	Watanabe, Kunihiko , et al.						
4/1	JP-62-199019	09/02/1987	Takaaki, Sasaki						

EXAMINER DATE CONSIDERED

Substitute for form 1449A/PTO	Under the Paperwork Reduction Act of 1995, no persons are Complete if Known	required to respond to a collection of information un	ecs it contains a valid OMB contro
INFORMATION DISCLOSURE STATEMENT BY APPROCANT	Application Number	09/944981	RECEI
Vilea as many shapes as nacessary	Filing Date	August 30, 2001	HEO
1 "1"	First Named Inventor	Ahn, Kie	S MUL
La Carette	Group Art Unit	2812	Join
SATEATS TRADERSE	Examiner Name	Lindsay, Walter	TECHCE
Sheet 5 of 12	Attorney Docket No: 1	303.021US1	1500

	OTHER	R DOCUMENTS NON PATENT LITERATURE DOCUMENTS	
Examiner Initials*	Cite No 1	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published.	T
.,		AARIK, JAAN, et al., "Atomic layer growth of epitaxial TiO/sub 2/ thin films from	
WL		TiCl/sub 4/ and H/sub 2/O on alpha -Al/sub 2/O/sub 3/ substrates", Journal of	
100		Crystal Growth, 242(1-2), (2002), 189-198	\sqcup
1		AARIK, JAAN, et al., "Influence of substrate temperature on atomic layer growth	
		and properties of HfO/sub 2/ thin films", Thin Solid Films, 340(1-2), (1999),110-	
000		116	$oxed{oxed}$
\ \ \ \		AARIK, JAAN, et al., "Phase transformations in hafnium dioxide thin films grown	1 1
11.1/		by atomic layer doposition at high temperatures", Applied Surface Science,	
W		173(1-2), (March 2001),15-21	1
1		AARIK, JAAN, et al., "Texture Development in nanocrystalline hafnium dioxide	
11 , Y	{	thin films grown by atomic layer deposition", Journal of Crystal Growth, 220,	l i
W		(2000),105-113	1
T_{M}		AHN, K. Y., et al., "Electron Beam Deposition of Amorphous Lanthanide-doped	
I W		TiOx Dielectric Films", 3 pages	
1,		ALEN, PETRA, "Atomic Layer deposition of Ta(Al)N(C) thin films using	1 1
1/1/		trimethylaluminum as a reducing agent", Journal of the Electrochemical Society,	
INL		148(10), (October 2001),G566-G571	
		BENDORAITIS, J G., et al., "Optical energy gaps in the monoclinic oxides of	
1 I M		hafnium and zirconium and their solid solutions", Journal of Physical Chemistry,	
		69(10), (1965),3666-3667	
1.10		BRAUD, F., "Ultra Thin Diffusion Barriers for Cu Interconnections at The	
-		Gigabit Generation and Beyond", VMIC Conference Proceedings, (1996),174-	
WI		179	
		BUNSHAH, ROINTAN F., et al., "Deposition Technologies for Films and	
1.14		Coatings: Developments and Applications", Park Ridge, N.J., U.S.A.: Noyes	
I WL		Publications, (1982),102-103	1
/ J.		CAVA, R J., et al., "Improvement of the dielectric properties of Ta/sub 2/O/sub 5/	
l <i>[.]11</i>		through substitution with Al/sub 2/O/sub 3/", Applied Physics Letters, 70(11),	
		(March 1997),1396-8	
7		CHAMBERS, J J., et al., "Physical and electrical characterization of ultrathin	
		yttrium silicate insulators on silicon", Journal of Applied Physics, 90(2), (July 15,	1 1
100		2001),918-33	
		COPEL, M., et al., "Structure and stability of ultrathin zirconium oxide layers on	-7
		Si(001)", Applied Physics Letters, 76(4), (January 2000),436-438	
		DE FLAVIIS, FRANCO, et al., "Planar microwave integrated phase-shifter	
,		design with high purity ferroelectric material", IEEE Transactions on Microwave	
I WL		Theory & Techniques, 45(6), (June 1997),963-969	
f n		DESU, S.B., "Minimization of Fatigue in Ferroelectric Films", Physica Status	
W .		Solidi A, 151(2), (1995),467-480	
			

EXAMINER MAN JAM DATE CONSIDERED 7/8/04

PTC/SB/08A(10-01)
Approved for use through 10/31/2002, CMB 651-0031
US Patent & Trademark Office, U.S. DEPARTMENT OF CONCERCE

Substitute for form 1449A/PTO	Under the Paperwork Reduction Act of 1995, no persons are Complete if Known		-1216	-0
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Number	09/944981	EEGEIV	
(Use as many sheets as necessary)	Filing Date	August 30, 2001	710	Lens
TON W	First Named Invent r	Ahn, Kie	WA 45	TOTAL
\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Group Art Unit	2812		
JUN 2 TRADELLE	Examiner Name	Lindsay, Walter	TEENCEN	EW GUT
Sheet 6 of 12	Attorney Docket No: 1	303.021US1		•

	100000000000000000000000000000000000000	
1/1/2	DING, "Copper Barrier, Seed Layer and Planerization Technologies", VMIC	
1916	Conference Proceedings, (1997),87-92	
<i> </i>	DUSCO, C, et al., "Deposition of tin oxide into porous silicon by atomic layer	
1/1/2	epitaxy", Journal of the Electrochemical Society, 143, (1996),683-687	
	EL-KAREH, B, et al., "The evolution of DRAM cell technology", Solid State	
Wh	<u>Technology, 40(5), (1997),89-90, 92, 95-6, 98, 100-1</u>	
1111	ENGELHARDT, M., "Modern Applications of Plasma Etching and Patterning in	
14//	Silicon Process Technology", Contributions to Plasma Physics, 39(5),	
<u> </u>	(1999),473-478	
	FUKUMOTO, HIROFUMI, et al., "Heteroepitaxial growth of Y2O3 films on	
W	silicon", Applied Physics Letters, 55(4), (July 24, 1989),360-361	
[1]	FUYUKI, TAKASHI, et al., "Electronic Properties of the Interface between Si and	
[<i>k]</i> //	TiO2 Deposited at Very Low Temperatures", <u>Japanese Journal of Applied</u>	
	Physics, Vol. 25, No. 9, (1986),1288-1291	
	GARTNER, M , et al., "Spectroellipsometric characterization of lanthanide-doped	
,	TiO2 films obtained via the sol-gel technique", Thin Solid Films, 234(1-2),	
WL	(1993),561-565	
110	GELLER, S., et al., "Crystallographic Studies of Perovskite-like Compounds. II.	
11/-	Rare Earth Aluminates", <u>Acta Cryst. Vol. 9</u> , (May 1956),1019-1025	
	GIESS, E. A., et al., "Lanthanide gallate perovskite-type substrates for epitaxial,	
WL	high-T/sub c/ superconducting Ba/sub 2/YCu/sub 3/O/sub 7- delta / films", IBM	
W.C.	Journal of Research and Development, 34(6), (November 1990),916-926	
A /	GUILLAUMOT, B, et al., "75 nm damascene metal gate and high-k integration	
WL	for advanced CMOS devices", Technical Digest of International Electron Devices	
WL	Meeting 2002, (2002),355-358	
//,	GUO, et al., "High Quality Ultra-thin (1.5nm) TiO2/Si3N4 Gate Dielectric fo rDeep	
WL	Sub-micron CMOS Technology", Ctied in related application,(1999),	
	GUSEV, E P., et al., "Ultrathin High-K Dielectrics Grown by Atomic Layer	
	Deposition: A Comparative Study of ZrO2, HfO2, Y2O3 and Al2O3",	
9/_	Electrochemical Society Proceedings Volume 2001-9, (2001),189-195	
	GUTOWSKI, M J., "Thermodynamic stability of high-K dielectric metal oxides	
///	ZrO/sub 2/ and HfO/sub 2/ in contact with Si and SiO/sub 2/", Applied Physics	
W/	Letters, 80(11), (March 18, 2002),1897-1899	_
1/2	HUNT, C. E., et al., "Direct bonding of micromachined silicon wafers for laser	
/ \//	diode heat exchanger applications", Journal of Micromechanics and	
'V_	Microengineering, 1(3), (September 1991), 152-156	
1 1	IDDLES, D.M., et al., "Relationships between dopants, microstructure and the	
<i> </i> /	microwave dielectric properties of ZrO2-TiO2-SnO2 ceramics", <u>Journal of</u>	
5	Materials Science, 27(23), (December 1992),6303-6310	
1 1.10	IIJIMA, T., "Microstructure and Electrical Properties of Amorphous W-Si-N	
W	Barrier Layer for Cu Interconnections", 1996 VMIC Conference, (1996),168-173	
1 10	JEON, SANGHUN, et al., "Excellent electrical characteristics of lanthanide (Pr,	
N(Nd, Sm, Gd, and Dy) oxide and lasthanide-doped oxide for MOS gate dielectric	_

EXAMINER Wally Live 1/8/09

Substitute for form 1449A/F INFORMATION STATEMENT B' (Use as many sheets as ne	DISCLOSURE Y APPLICANT
	ON 21 TON SEE
Sheet 7 of 12	ENT & TRADES

Complete if Known		-CEIVED
Application Number	09/944981	RECE
Filing Date	August 30, 2001	HOUR CS HELL
First Named Invent r	Ahn, Kie	_
Group Art Unit	2812	TECH CENTER 25
Examiner Name	Lindsay, Walter	TECH CALL

Attorney Docket No: 1303.021US1

	Testing II Floring Devices Marking 2004 IFDM Technical Discot	
W	applications", Electron Devices Meeting, 2001. IEDM Technical Digest. International, (2001),471-474	
	JEONG, CHANG-WOOK, et al., "Plasma-Assisted Atomic layer Growth of High-	
/ /,	Quality Aluminum Oxide Thin Films", <u>Japanese Journal of Applied Physics</u> , 40,	
1/1//	(January 2001),285-289	
1000	JUNG, H S., et al., "Improved current performance of CMOSFETs with nitrogen	
11/1	JONG, IT 5., et al., improved current performance of Civios PETS with introgen	
14/L_	incorporated HfO/sub 2/-Al/sub 2/O/sub 3/ laminate gate dielectric", Technical	
, , , , , , , , , , , , , , , , , , ,	Digest of International Electron Devices Meeting 2002, (2002),853-856	
11/1	KANG, L, et al., "MOSFET devices with polysilicon on single-layer HfO/sub 2/	
\ <i> ,/ </i>	high-K dielectrics", International Electron Devices Meeting 2000. Technical	
V	<u>Digest. IEDM.</u> (2000),35-8	
11/6	KEOMANY, D., et al., "Sol gel preparation of mixed cerium-titanium oxide thin	
INL	films", Solar Energy Materials and Solar Cells, 33(4), (August 1994),429-441	
///	KIM, Y W., et al., "50nm gate length logic technology with 9-layer Cu	
<i> [. </i>	interconnects for 90nm node SoC applications", Technical Digest of International	
W	Electron Devices Meeting 2002, (2002),69-72	
1/	KIM, C. T., et al., "Application of Al3O3 Grown by Atomic Layer Deposition to	
1,//	DRAM and FeRAM", 12th International Symposium in Integrated Ferroelectrics,	
	(March, 2000),1 page	
11	KIM, D., et al., "Atomic Control of Substrate Termination and Heteroepitaxial	
1./4	Growth of SrTiO3/LaAlO3 Films", Journal of the Korean Physical Society, 36(6),	
W_	(June 2000),444-448	
	KIM, BYOUNG-YOUP, et al., "Comparison study for TiN films deposited from	
1 1 / . 1	different method: chemical vapor deposition and atomic layer deposition",	
	Mechanisms of Surface and Microstructure Evolution in Deposited Films and	
WL	Film Structures Symposium (Materials Research Society Symposium	
	Proceedings Vol.672), (2001),7.8.1-7.8.6	
1/6	KIM, TAESEOK, et al., "Correlation between strain and dielectric properties in	
1 <i>N/L</i> 1	ZrTiO/sub 4/ thin films", Applied Physics Letters, 76(21), (May 2000),3043-3045	
	KIM, TAESEOK, et al., "Dielectric properties and strain analysis in paraelectric	
1 1.1.	ZrTiO/sub 4/ thin films deposited by DC magnetron sputtering", <u>Japanese</u>	
4/1	Journal of Applied Physics Part 1-Regular Papers Short Notes & Review Papers,	
1 1/2	vol.39, no.7A, (2000),4153-4157	
 	KIM, YONGJO, et al., "Effect of microstructures on the microwave dielectric	
	properties of ZrTiO/sub 4/ thin films", Applied Physics Letters, 78(16), (April	
14//	2001),2363-2365	
· · · - · · · · · · · · · · · · · ·	KIM, Y, et al., "Substrate dependence on the optical properties of Al/sub	-
11/6	2/O/sub 3/ films grown by atomic layer deposition", Applied Physics Letters.	
W		
	71(25, 22), (December 1997),3604-3606	

EXAMINER	Will- mille	DATE CONSIDERED	7/8	10	4
	Substitute Charles us Statement Sam (CTO-144S)			$\overline{}$	

PTO/SB/084(10-01)
Approved for use through 10/31/2002, QMB 651-0331
US Patent & Trademark Office, U.S., DEPARTMENT OF COMMERCE

Substitute for form 1449A/PTO	Under the Paperwork Reduction Act of 1895, no persons are Complete if Known	required to respond to a collection of information un	less il containe a valid OMB control number.
INFORMATION DISCLOSURE	Application Number	09/944981	BECEIVE
STATEMENT BY APPLICATED USe as many sheets as necessary	Filing Date	August 30, 2001	HE
O TON E	First Named Inventor	Ahn, Kie	JMM: 5.3 5004
	Gr_up Art Unit	2812	ŭ
JUN 2 THACELLE	Examiner Name	Lindsay, Walter	TECH GENTER'
Sheet 8 of 12	Attorney Docket No: 1	1303.021US1	

1	_	
	KRAUTER, G., et al., "Room Temperature Silicon Wafer Bonding with Ultra-Thin	
111/2	Polymer Films", Advanced Materials, 9(5), (1997),417-420	
17/7	KUKLI, KAUPO, "Atomic Layer Deposition of Titanium Oxide from Til4 and	
1 Wh	H2O2", Chemical Vapor Deposition, 6(6), (2000),303-310	
	KUKLI, K, et al., "Comparison of hafnium oxide films grown by atomic layer	
14/	deposition from iodide and chloride precursors", Thin Solid Films, 416,	
W	(2002),72-79	
1.12	KUKLI, K, et al., "Controlled growth of yttrium oxysulphide thin films by atomic	
I WL	layer deposition", Materials Science Forum, 315-317, (1999),216-221	
	KUKLI, KAUPO, et al., "Dielectric Properties of Zirconium Oxide Grown by	
1/1/_	Atomic Layer Deposition from Iodide Precursor", Journal of The Electrochemical	
	Society, 148(12),(2001),F227-F232	
1/6	KUKLI, KAUPO, et al., "Influence of thickness and growth temperature on the	
1 1, //	properties of zirconium oxide films growth by atomic layer deposition on silicon",	
	Thin Solid Films, 410(1-2), (2002),53-60	
	KUKLI, KAUPO, et al., "Low-Temperature Deposition of Zirconium Oxide-Based	
1/1/	Nanocrystalline Films by Alternate Supply of Zr[OC(CH3)3]4 and H2O",	
	Chemical Vapor Deposition, 6(6), (2000),297-302	
[/ / ₄]	KUKLI, K J., et al., "Properties of hafnium oxide films grown by atomic layer	
	deposition from hafnium tetraiodide and oxygen", Journal of Applied Physics,	
LNL_	92(10), (November 15, 2002),5698-5703	
1/1	KWO, J., et al., "High gate dielectrics Gd2O3 and Y2O3 for silicon", Applied	
ML	Physics Letters, 77(1), (July 3, 2000),130-132	
191	KWO, J., "Properties of high k gate dielectrics Gd2O3 and Y2O3 for Si",	
W	Journal of Applied Physics, 89(7), (2001),3920-3927	
	LAURSEN, T., "Encapsulation of Copper by Nitridation of Cu-Ti Alloy/Bilayer	
	Structures", International Conference on Metallurgical Coatings and Thin Films,	
	Abstract No. H1.03, San Diego, CA,(April 1997),309	
	LEE, BYOUNG H., et al., "Characteristics of TaN gate MOSFET with ultrathin	
WL_	hafnium oxide (8 A-12 A)", Electron Devices Meeting, 2000. IEDM Technical	
Iv -	Digest, International, (2000),39-42	
1 40/5	LEE, A E., et al., "Epitaxially grown sputtered LaAlO3 films", Applied Physics	
100	Letters, 57(19), (November 1990),2019-2021 LEE, S J., et al., "High quality ultra thin CVD HfO2 gate stack with poly-Si gate	
1 \.//	electrode", Electron Devices Meeting, 2000. IEDM Technical Digest.	
W/_		
/ - - - - -	International, (2000),31-34 LEE, CHENG-CHUNG, et al., "Ion-assistend deposition of silver films", Thin	
1 1/1 -	Solid Films, vol. 359, (2000),95-97	
10	LEE, JUNG-HYOUNG, et al., "Mass production worthy HfO/sub 2/-Al/sub	
1111	2/O/sub 3/ laminate capacitor technology using Hf liquid precursor for sub-100	
1 1.//	nm DRAMs", Electron Devices Meeting, 2002. IEDM '02. Digest. International,	
W L	(2002),221-224	
	1/2002/1227	

EXAMINER MOMENTAL DATE CONSIDER	io 7/6/09

PTO/SB/08A(10-01)
Approved for use through 10/31/2002, DIAB 651-0031
US Patent & Trademark Office, U.S. DEPARTMENT OF COMMERCE

Substitute for form 1449A/PTO	Under the Paperwork Reduction Act of 1995, no persons are Complete if Known		MED
INFORMATION DISCLOSURE STATEMENT BY APPLICANE	Application Number	09/944981	ECEMIED
(Use as many sheets as necessary)	Filing Dat	August 30, 2001	SECK ONLY
700	First Named Inventor	Ahn, Kie	1111 23 2004
\ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Group Art Unit	2812	100
32	Examiner Name	Lindsay, Walter	THE CHIEF THE PARTY OF THE PART
Sheet 9 of 12	Attorney Docket No: 1	303.021US1	TECHCENTA

	LEE, DONG H., et al., "Metalorganic chemical vapor deposition of TiO2:N	
1 1.1.	anatase thin film on Si substrate", Appl. Phys. Lett., 66(7), (February 1995),815-	
WL.	816	
We	LEE, L.P., et al., "Monolithic 77 K.dc SQUID magnetometer", Applied Physics	
WC	Letters, 59(23), (December 1991),3051-3053	
	LEE, C. H., et al., "MOS Characteristics of Ultra Thin Rapid Thermal CVD ZrO2	
	and Zr Silicate Gate Dielectrics", Electron Devices Meeting, 2000. IEDM	
WC	Technical Digest. International, (2000),27-30	
	LEE, C H., et al., "MOS Devices with High Quality Ultra Thin CVD ZrO2 Gate	
	Dielectrics and Self-Aligned TaN and TaN/Poly-Si Gate electrodes", 2001	
100	Symposium on VLSI, Technology Digest of Technical Papers, (2001), 137-138	
.,	LEE, et al., "Ultrathin Hafnium Oxide with Low Leakage and excellent Reliability	
1./1	fo rAlternative Gae Dielecric Application", IEEE Technical Digest of International	
14	Electron Devices Meeting 1999, (1999),133-136	
h./1	LESKELA, M., et al., "ALD precursor chemistry: Evolution and future	
	challenges", <u>J. Phys. IV France</u> , 9, (1999),837-852	
1/1	LUAN, et al., "High Quality Ta2O5 Gate Dielectrics and T[]", IEEE Technical	
WL	<u>Digest of Int. Elec. Devices Mtng 1999, (1999), 141-142</u>	
[]	LUCOVSKY, G, et al., "Microscopic model for enhanced dielectric constants in	
h/1	low concentration SiO/sub 2/-rich noncrystalline Zr and Hf silicate alloys",	
104-	Applied Physics Letters, 77(18), (October 2000),2912-2914	
1 + <i>f</i> : 1	LUO, Z J., et al., "Ultra-thin ZrO2 (or Silicate) with High Thermal Stability for	
	CMOS GAte Applications", 2001 Symposium on VLSI Technology Digest of	
	Technical Papers, (2001), 135-136	
	MARTIN, et al., "Ion-beam-assisted deposition of thin films", Applied Optics,	
MP -	22(1), (1983),178-184 MOLODYK, A A., et al., "Volatile Surfactant-Assisted MOCVD: Application to	
1/1	LaAl03 Thin Film Growth", Chemical Vapor Deposition, 6(3), (June 2000),133-	
W	138	
<u>, "</u>	MOLSA, HEINI, et al., "Growth of yttrium oxide thin films from beta -diketonate	
	precursor", Advanced Materials for Optics and Electronics, 4(6), (November-	
M	December 1994),389-400	
l v	NAKAGAWARA, OSAMU, et al., "Electrical properties of (Zr, Sn)TiO4 dielectric	
	thin film prepared by pulsed laser deposition", <u>Journal of Applied Physics</u> , 80(1),	
W/	(July 1996),388-392	
	NAKAJIMA, ANRI , et al., "Atomic-layer deposition of ZrO/sub 2/ with a Si nitride	
	barrier layer", Applied Physics Letters, vol.81, no.15, (October 2002),2824-2826	
'	NAKAJIMA, ANRI, et al., "NH/sub 3/-annealed atomic-layer-deposited silicon	-
	nitride as a high-k gate dielectric with high reliability", Applied Physics Letters,	
1111	80(7), (February 2002),1252-1254	
A #11	NAKAJIMA, ANRI , "Soft breakdown free atomic-layer-deposited silicon-	
'W _	nitride/SiO/sub 2/ stack gate dielectrics", International Electron Devices Meeting.	
417	Technical Digest, (2001),6.5.1-4	
	/ // / /	

EXAMINER MARTINE DATE CONSIDERED 18/04

PTO/SB/08A(10-01)
Approved for use through 10/31/2002. OMB 651-0031
US Peter & Trademan Office U.S. DEFARTMENT OF COMMERCE
Under the Peperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Complete if Known Substitute for form 1449A/PTO INFORMATION DISCLOSURE 09/944981 **Application Number** STATEMENT BY APPLICAND August 30, 2001 **Filing Date** Ahn, Kie **First Named Inventor** 2812 **Group Art Unit** TECH CENTER TON **Examiner Name** Lindsay, Walter Attorney Docket No: 1303.021US1 Sheet 10 of 12

<i>i </i>	NEUMAYER, D A., et al., "Materials characterization of ZrO/sub 2/-SiO/sub 2/	
////	and HfO/sub 2/-SiO/sub 2/ binary oxides deposited by chemical solution	
/ /	deposition", Journal of Applied Physics, 90(4), (August 15, 2001), 1801-1808	
	NIILISK, A, "Atomic-scale optical monitoring of the initial growth of TiO2 thin	
[//]	films", Proceedings of the SPIE - The International Society for Optical	
INL	Engineering, 4318, (2001),72-77	
1.1	OATES, D E., et al., "Surface impedance measurements of YBa/sub 2/Cu/sub	
1 / // 1	3/O/sub 7-x/ thin films in stripline resonators", IEEE Transactions on Magnetics,	
<i> </i>	vol.27, no.2, pt.2, (March 1991),867-871	
1	OH, C B., et al., "Manufacturable embedded CMOS 6T-SRAM technology with	
	high-k gate dielectric device for system-on-chip applications", <u>Technical Digest of</u>	
<i> </i> //	International Electron Devices Meeting 2002, (2002),423-426	
104		
1//	OSTEN, H J., et al., "High-k Gate Dielectrics with Ultra-low Leakage Current	
	Based on Praseodymium Oxide", Technical Digest of IEDM, (2000),653-656	
11/1	PARK, JAEHOO, et al., "Chemical vapor deposition of HfO/sub 2/ thin films	
1 1. //	using a novel carbon-free precursor: characterization of the interface with the	
11/1 -	silicon substrate", Journal of the Electrochemical Society, 149(1), (2002),G89-	
100	G94	
1 1 1	PARK, BYUNG-EUN , et al., "Electrical properties of LaAlO3/Si and	
11.//	Sr0.8Bi2.2Ta2O9/LaAlO3/Si structures", Applied Physics Letters, 79(6), (August	
11/2	2001),806-808	
\	PERKINS, CHARLES M., et al., "Electrical and materials properties of ZrO2 gate	
h/l	dielectrics grown by atomic layer chemical vapor deposition", Applied Physics	
11/4-	Letters, 78(16), (April 2001),2357-2359	
	POVESHCHENKO, V P., et al., "Investigation of the phas composition of films of	
	zirconium, hafnium and yttrium oxides", Soviet Journal of Optical Technology,	
	<u>51(5),</u> (1984),277-279	
1/1	QI, W , "MOSCAP and MOSFET characteristics using ZrO2 gate dielectric	
MM	deposited directly on Si", IEDM - Technical Digest, (1999),145-148	
	QI, WEN-JIE, et al., "Performance of MOSFETs with ultra thin ZrO/sub 2/ and Zr	
1./1	silicate gate dielectrics", 2000 Symposium on VLSI Technology. Digest of	
N/	Technical Papers, (2000),40-41	
1/1	RAHTU, ANTTI, et al., "Atomic Layer Deposition of Zirconium Titanium Oxide	
	from Titanium Isopropoxide and Zirconium Chloride", Chemistry of Materials,	
	13(5), (May 2001),1528-1532	
	RAMAKRISHNAN, E.S., et al., "Dielectric properties of radio frequency	
I W I	magnetron sputter deposited zirconium titanate-based thin films", Journal of the	
	Electrochemical Society, 145(1), (January 1998),358-362	
<u> </u>	RAYNER JR., G, et al., "The structure of plasma-deposited and annealed	
1 6/1	pseudo-binary ZrO2-SiO2 alloys", Materials Research Society Symposium -	
1 1 1	Proceedings, 611, (2000),C131-C139	
1.1	RITALA, MIKKO, "Atomic Layer Epitaxy Growth of Titanium, Zirconium and	
\.	Hafnium Dioxide Thin Films", Annales Academiae Scientiarum Fennicae,	
NU	(1994),24-25	

EXAMINER **DATE CONSIDERED**

	U
Substitute for form 1449A/PTC	
STATEMENT BY	APPLICANTE
(Use as many sheets as neces	ssary)
	Age of the second
	1 2 1 200 E
	\a se
Sheet 11 of 12	TENT & TRADE
Direct troitz	

Application Number	09/944981	
Filing Date	August 30, 2001	AFO
First Named Inventor	Ahn, Kie	7 كى د
Group Art Unit	2812	•
Examiner Name	Lindsay, Walter	المنان المنافعة المنا

•		
	RITALA, MIKKO, et al., "Zirconium dioxide thin films deposited by ALE using	
WL	zirconium tetrachloride as precursor", Applied Surface Science, 75, (January	
W L	1994),333-340	
	ROBERTSON, J., "Band offsets of wide-band-gap oxides and implications for	
	future electronic devices", Journal of Vacuum Science & Technology B	
11.71	(Microelectronics and Nanometer Structures), 18(3), (May-June 2000),1785-	
WC	1791	
, 1	ROSSNAGEL, S.M., et al., "Plasma-enhanced atomic layer deposition of Ta and	
1/4/1	Ti for Interconnect diffusion barriers", Journal of Vacuum Science & Technology	
WL	B (Microelectronics and Nanometer Structures), 18(4), (July 2000),2016-2020	
	ROTONDARO, A L., et al., "Advanced CMOS Transistors with a Novel HfSiON	
1.4	Gate Dielectric", Symposium on VLSI Technology Digest of Technical Papers,	
M	(2002),148-149	
14/7	RYU, CHANGSUP, "Barriers for Copper Interconnections", Solid State	
$ \mathcal{V} \cup $	Technology, 42(4), (April 1999),53-56	
i /	SAITO, Y, "High-Integrity Silicon Oxide Grown at Low-temperature by Atomic	
+ $+$ $+$ $+$ $+$	Oxygen Generated in High-Density Krypton Plasma", Extended Abstracts of the	
W/	1999 International Conference on Solid State Devices and Materials, (1999),152-	
<i>'</i>	153	
11	SHANWARE, A, et al., "Reliability evaluation of HfSiON gate dielectric film with	
\\h/ _t	12.8 A SiO2 equivalent thickness", International Electron Devices Meeting.	
V_	<u>Technical Digest</u> , (2001),137-140	
1/	SHIN, CHANG H., et al., "Fabriation and Characterization of MFISFET Using	
	Al2O3 Insulating Layer for Non-volatile Memory", 12th International Symposium	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	in Integrated Ferroelectrics, (March 2000),9 pages	
1///	SNEH, OFER, et al., "Thin film atomic layer deposition equipment for	
014	semiconductor processing", Thin Solid Films, 402(1-2), (Jan. 1, 2002),248-261	
1/.	SONG, HYUN-JUNG, et al., "Atomic Layer Deposition of Ta2O5 Films Using	
1 1/1	Ta(OC2H5)5 and NH3", Ultrathin SiO/sub 2/ and High-K Materials for ULSI Gate	
NL	Dielectrics. Symposium, (1999),469-471	
1.//	SOUCHE, et al., "Visible and infrared ellipsometry study of ion assisted SiO2	
NL	films", (1998),676-681	
1 1/1	SUNTOLA, T., "Atomic Layer Epitaxy", Handbook of Crystal Growth, 3; Thin	
<i> N </i>	Films of Epitaxy, Part B: Growth Mechanics and Dynamics,	
144	Amsterdam,(1994),602-663	
	TAKEMOTO, J. H., et al., "Microstrip Resonators and Filters Using High-TC	
<i>n//</i>	Superconducting Thin Films on LaAlO3", IEEE Transaction on Magnetics, 27(2).	
\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	(March 1991),2549-2552	
1 1 // 1	TARRE, A , et al., "Comparative study of low-temperature chloride atomic-layer	
h//	chemical vapor deposition of TiO2 and SnO2", Applied Surface Science, 175-	
· v ~	176, (May 2001),111-116	

EXAMINER WALL Line & DATE CONSIDERED 18104

Substitute for form 1449A/PTO	Under the Papernork Reduction Act of 1995, no persons are a Complete if Known	reducer in restour to a constraint or the investment of	
INFORMATION DISCLOSURE STATEMENT BY APPLICANT	Application Numb r	09/944981	Ó
(Use as many sheets as necessary)	Filing Date	August 30, 2001	ENER
/0 ~	First Named Inventor	Ahn, Kie	SECC.
WH 27 2004	ভ Group Art Unit	2812	13 200
/ JUH -	Examiner Name	Lindsay, Walter	JUN 2
Sheet 12 of 12	Attorney Docket No: 1303.021US1		ECH CENTER 22

A No. of the second

		_
1 1/	TAVEL, B, et al., "High performance 40 nm nMOSFETs with HfO/sub 2/ gate	
1.//	dielectric and polysilicon damascene gate", Technical Digest of International	
1111	Electron Devices Meetings 2002, (2002),429-432	
1, 1,	VAN DOVER, R. B., et al., "Amorphous lanthanide-doped TiOx dielectric films",	
1/1/-	Applied Physics Letters, 74(20), (May 17, 1999),3041-3043	
100	Applied Frysics Letters, 74(20), (May 17, 1999), 304 1-3043	
111.	VAN DOVER, R B., et al., "Deposition of Uniform Zr-Sn-Ti-O Films by On-Axis	
14/1	Reactive Sputtering", <u>IEEE Electron Device Letters, 19(9),</u> (September	
WL	1998),329 - 331	
7 /1	VAN DOVER, R. B., et al., "Discovery of a useful thin-film dielectric using a	
	composition-spread approach", Nature, 392(6672), (March 12, 1998),162-4	
V; f-1	VIIROLA, H, "Controlled growth of antimony-doped tin dioxide thin films by	
	atomic layer epitaxy", Thin Solid Films, 251, (November 1994),127-135	
PV		
11/	VISOKAY, M R., "Application of HfSiON as a gate dielectric material", Applied	
WC	Physics Letters, 80(17), (April 2002),3183-3185	
111	WILK, G D., et al., "Hafnium and zirconium silicates for advanced gate	
WZ	dielectrics", Journal of Applied Physics, 87(1), (January 2000),484-492	_
	WILK, G. D., et al., "High-K gate dielectrics: Current status and materials	
	properties considerations", Journal of Applied Physics, 89(10), (May 2001),5243-	
11///	5275	
700	WOLF, STANLEY, et al., "Future Trends in Sputter Deposition Processes", In:	
/ /1		
11/4	Silicon Processing of the VLSI Era, Vol. 1, Lattice Press, (1986), 374-380	
107/	WOLFRAM, G, et al., "Existence range, structural and dielectric properties of	
1 4// -	ZrxTiySnzO4 ceramics (x + y =2)*, Materials Research Bulletin, 16(11),	
100	(November 1981),1455-63	
	YAMAGUCHI, TAKESHI, "Band Diagram and Carrier Conduction Mechanism in	
1111	ZrO2/Zr-silicate/Si MIS Structure Fabricated by Pulsed-laser-ablation	
h//	Deposition", Electron Devices Meeting, 2000. IEDM Technical Digest.	
N L	International, (2000),19-22	
 	YAMAGUCHI, TAKESHI, et al., "Study on Zr-Silicate Interfacial Layer of ZrO2-	
lr k		
11./\	MIS Structure FAbricated by Pulsed Laser Ablation Deposition Method", Solid	
\mathbb{H}^{N}	State Devices and Materials, (2000),228-229	
14/1	ZHANG, H., "Atomic Layer Deposition of High Dielectric Constant	
	Nanolaminates", Journal of The Electrochemical Society, 148(4), (April	
1111	2001),F63-F66	
/ h	ZHANG, H, et al., "High permittivity thin film nanolaminates", Journal of Applied	
1 1/1-1	Physics, 87(4), (February 2000), 1921-1924	
 	ZHU, W, et al., "HfO2 and HfAIO for CMOS: Thermal Stability and Current	
	Tranport", IEEE International Electron Device Meeting 2001, (2001),463-466	
\\ \\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	Trianport, incertainmentalional Electron Device Micetally 2001, (2001),400-400	
1 1./1	ZUCKER, O, et al., "Application of Oxygen Plasma Processing to Silicon Direct	
$\square^{w} \hookrightarrow$	Bonding", Sensors and Actuators A. 36, (1993),227-231	

EXAMINER Male Truelle	DATE CONSIDERED 7/8/04